

6-30-00

Docket No.

7954/1

UTILITY PATENT APPLICATION TRANSMITTAL
(Small Entity)*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

Total Pages in this Submission

46

TO THE ASSISTANT COMMISSIONER FOR PATENTS**Box Patent Application**
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

DOMED PACKING MATERIAL

and invented by:

Peter H. SeckelIf a **CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

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☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 22 pages and including the following:
 - a. ☒ Descriptive Title of the Invention
 - b. ☐ Cross References to Related Applications (if applicable)
 - c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. ☐ Reference to Microfiche Appendix (if applicable)
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings (if drawings filed)
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

UTILITY PATENT APPLICATION TRANSMITTAL (Small Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

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46

Application Elements (Continued)

3. ☒ Drawing(s) (when necessary as prescribed by 35 USC 113)
- a. ☐ Formal b. ☒ Informal Number of Sheets 14
4. ☒ Oath or Declaration
- a. ☒ Newly executed (original or copy) ☐ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional application only)
- c. ☒ With Power of Attorney ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference (usable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Computer Program in Microfiche
7. ☐ Genetic Sequence Submission (if applicable, all must be included)
- a. ☐ Paper Copy
- b. ☐ Computer Readable Copy
- c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☐ Assignment Papers (cover sheet & documents)
9. ☐ 37 CFR 3.73(b) Statement (when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Acknowledgment postcard
14. ☒ Certificate of Mailing
- ☐ First Class ☒ Express Mail (Specify Label No.): EL548970878US

UTILITY PATENT APPLICATION TRANSMITTAL (Small Entity)

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Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. ☒ Small Entity Statement(s) - Specify Number of Statements Submitted: 1
17. ☐ Additional Enclosures (please identify below):

Fee Calculation and Transmittal

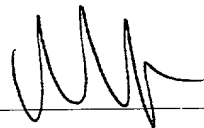
CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	27	- 20 =	7	x \$9.00	\$63.00
Indep. Claims	5	- 3 =	2	x \$39.00	\$78.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$345.00
OTHER FEE (specify purpose)					\$0.00
TOTAL FILING FEE					\$486.00

- ☒ A check in the amount of 486.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 06-2143 as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of _____ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated:

6/29/00



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06/29/00
JC784 U.S. PTO

06-30-00

JC829 U.S. PTO
09/606555
06/29/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box: Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Our file: 7954/1
Applicant: Peter H. Seckel
Serial No.:
Filing Date:
Title: Domed Packing Material

Office:
Examiner:

Sir:

Enclosed for filing in the United States Patent and Trademark Office is the following:

1. Patent Application (22 pages)
2. Drawings (14 pages), FIGS. 1-15
3. Utility Patent Application Transmittal
4. Declaration and Power of Attorney
5. Small Entity Statement
6. Transmittal Sheet
7. Postcard Receipt

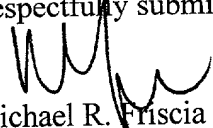
CONDITIONAL PETITION

If any extension of time is required for the submission of the above-identified items, Applicant requests that this be considered a petition therefor. Please charge any additional charges or any other charges relating to this matter to deposit account of the writer, **Account No. 06-2143**. A duplicate copy of this letter is enclosed.

6/29/00
Date

enc.

Respectfully submitted,


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I hereby certify that this correspondence is being deposited with the United States Postal Service, postage prepaid, as "Express Mail Post Office to Addressee," Mailing Label No. EL548970878US to Box: Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231 on 6/29/00.

By: 
Michael R. Friscia

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY ' STATUS (37 CFR 1.9(f) AND 1.27 (b)) - INDEPENDENT INVENTOR

Docket No.
7954/1

Serial No.

Filing Date

Patent No.

Issue Date

Applicant/ **Peter H. Seckel**
Patentee:

Invention: **DOMED PACKING MATERIAL**

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled above and described in:

- ☒ the specification to be filed herewith.
☐ the application identified above.
☐ the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ No such person, concern or organization exists.
☐ Each such person, concern or organization is listed below.

***NOTE:** Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

FULL NAME

ADDRESS

☐ Individual☐ Small Business Concern☐ Nonprofit Organization

FULL NAME

ADDRESS

☐ Individual☐ Small Business Concern☐ Nonprofit Organization

FULL NAME

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FULL NAME

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☐ Individual☐ Small Business Concern☐ Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF INVENTOR Peter H. Seckel
 SIGNATURE OF INVENTOR *Peter H. Seckel* DATE: 6/26/00

NAME OF INVENTOR _____
 SIGNATURE OF INVENTOR _____ DATE: _____

NAME OF INVENTOR _____
 SIGNATURE OF INVENTOR _____ DATE: _____

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NAME OF INVENTOR _____
 SIGNATURE OF INVENTOR _____ DATE: _____

NAME OF INVENTOR _____
 SIGNATURE OF INVENTOR _____ DATE: _____

Small Entity Declaration: I am filing this application as a small entity under 37 CFR 1.28(b). I am not aware of any other applications or patents owned by me or my immediate family members that relate to the invention claimed in this application.

22 5787778

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR: PETER H. SECKEL

TITLE: DOMED PACKING MATERIAL

SPECIFICATION

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to packing materials for use in cushioning items, and more specifically to a packing material having a plurality of layers of material which nest to take a minimal amount of space prior to use, but which layers can be pulled apart and disoriented to take up a large amount of space to function as a packing material.

RELATED ART

In the past, there have been many attempts to provide packing materials for positioning around items to be shipped in containers, boxes or otherwise. Crumpled newspaper is one such packing material that is and has been in widespread use. Shredded paper is another such material. These materials suffer from moisture absorption and provided limited elastic cushioning. Another common material is plastic "bubble wrap," trademarked "BUBBLE WRAP" by the Sealed Air Corporation and which consists ^{of two layers} a lower layer and an upper layer with numerous air bubbles formed therebetween for holding air. This packing material is very useful because it is very light in weight. However, one particular problem with bubble wrap material, which has not been overcome is the fact that even when it is not in use, it still takes up a large amount of space. Bubble wrap material is bulky and space consuming through its entire life -

from manufacturing, shipping, storage on distributor and retail shelves, in homes or factories before use and lastly during its disposal. Because of the large continual space requirements, individuals, businesses, and others may be reluctant to purchase and store this material.

Various other types of packing materials have also been invented and used, including, pellets made of styrofoam or other materials, shells made of styrofoam, etc. Another material used for packing is embossed paper. Again, as with the bubble wrap, a common problem among all of these materials is that they are bulky during their entire life.

Other efforts in this and related areas include the following:

U.S. Patent No. 5,538,778 to Hurwitz, et al., which discloses a cushioning material for packing in the form of an expanded paper material which can be shipped in an unexpanded form and expanded prior to use. It is designed with a plurality of slits and then pulled to form hexagonal cells.

U.S. Patent No. 4,518,643 to Francis, discloses a plastic film having a permanently embossed design or geometric shape for controlling the coefficient of friction between adjacent sheets of film.

U.S. Patent No. 3,575,781 to Pezely, discloses a plastic film wrapping material formed with hemispherical protuberances thereon. These sheets will not nest tightly stored on each other.

U.S. Patent No. 3,231,454 to Williams, discloses a cushioning packaging material formed of either one or two sheets having a plurality of hollow projections extending from one side of the sheet in the same direction. When a bottom surface is utilized, a vent is provided in the projections to allow air to escape. Again, this material will occupy much space prior to use.

Others works, in related areas, include: U.S. Patent No. 2,285,335 to Hurt; U.S. Patent No. 5,201,154 to Thomas; U.S. Patent No. 3,940,811 to Tomikawa, et al.; U.S. Patent No. 3,911,187 to Raley; U.S. Patent No. 3,525,663 to Hale; and U.S. Patent No. 3,484,835 to Trounstone, et al.

What has not been previously developed, and what would be highly desirable, is for a packing material that takes up the smallest possible amount of space prior to use, but provides bulk and elastic cushioning when in use. The present invention achieves this, as will be hereinafter described. It is believed that nothing prior hereto has been successful in achieving this, and that none of the previous work of others teaches or suggests all of the aspects of the present invention.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the present invention to provide a packing material that takes up a minimal amount of space prior to use, but which can then be converted into a bulky, elastic cushioning packing medium.

It is a further object of the present invention to provide a packing material having domes formed in a substrate.

It is an additional object of the present invention to provide a packing material comprising a plurality of sheets of materials with corresponding domes formed therein, which domes nest completely prior to use.

It is even an additional object of the present invention to provide a domed packing material having a plurality of layers which, when separated and disoriented, take up a large volume of space because of the domes therein.

It is even an additional object of the present invention to provide a packing material comprising a plurality of layers with domes of various sizes and shapes and directions formed therein.

It is even an additional object of the present invention to provide a packing material having a plurality of layers with domes formed therein, wherein the pattern of domes is varied to prevent re-nesting of the layers after they are disoriented.

It is an additional object of the present invention to provide methods for manufacturing the dome packing material of the present invention.

It is a further object of the present invention to provide a packing material that minimizes space and costs associated with shipping, storage, the display thereof for sale and its disposal.

It is an additional object of the present invention to provide a method for manufacturing a packing material that is inexpensive.

It is an additional object of the present invention to provide a method for continuous manufacturing of a packing material.

It is an additional object of the present invention to provide a method for manufacturing a packing material that is capable of being assembled into small units convenient for the display and sale thereof.

It is an additional object of the present invention to provide a method for manufacturing a packing material that is capable of being assembled in standard size boxes for sale and display.

The present invention relates to a packing material having a plurality of domes formed therein. The domes can be formed in more than one direction and can be of different sizes. A plurality of layers of a pliable plastic material are placed together to form a composite material, and domes are formed in the composite material. Thereafter, the composite material can be cut

or torn to desired sizes or shapes. Importantly, the domes formed in the layers are ^{tightly} ~~tighter~~ nested and accordingly, the packaging material takes up the smallest possible space after same is manufactured. This serves to minimize the expense and space requirements for storage and shipping and disposal. In use, one separates the layers of the composite materials, and disorients same, and utilizes the layers for a packing material. Importantly, it is preferable that the domes are sized or shaped and positioned to tend against re-nesting. Methods of making the material are also set forth.

BRIEF DESCRIPTION OF THE DRAWINGS

Other important objects and features of the invention will be apparent from the following Detailed Description of the Invention taken in connection with the accompanying drawings in which:

FIG. 1 is a partial perspective view of the domed packing material of the present invention having a plurality of domes of different shapes and directions formed in a plurality of tight layers.

FIG. 2 is a cross-sectional view of a dome in the packing material shown in **FIG. 1**.

FIG. 3 is a cross-sectional view of a plurality of domes taken along line 3-3 of **FIG. 1**.

FIGS. 4, 5, 6, 7, and 8 are perspective views of a substrate for forming a plurality of layers of packing material by folding one sheet in a plurality of directions, and then processing the sheet to form domes therein, and subsequently unfolding the assembly.

FIG. 9 is a schematic view of a method of forming the domed packing material of the present invention.

FIGS. 10A-10D show steps for another method of forming the domed packing material of the present invention.

FIG. 11 is a schematic view of another method of forming the domed packing material of the present invention.

FIGS. 12A and 12B show prior art materials wherein adjacent layers do not fully nest.

FIG. 13 is a diagram of a potential scheme of domes formed in layers according to the present invention designed to prevent re-nesting of the layers once the layers are disoriented.

FIGS. 14 and 15 are side views of a dome scheme designed to prevent re-nesting of adjacent layers after same are disoriented.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a packing material having a plurality of domes formed in multiple assembled layers of material. A plurality of sheets are stacked together and then domes are formed in the assembly such that the domes nest completely. This results in a packaging material that takes up a minimal amount of space prior to use. In use, the layers are separated and disoriented to create a packing material that is bulky and elastic. It is preferable that the domes are varied in size and direction to prevent re-nesting of the layers after they are separated and disoriented.

Referring to **FIG. 1**, a partial perspective view of the domed packaging material, generally indicated at **20**, is shown. As can be seen, in this view, there is a lower layer generally indicated at **20A** and an upper layer generally indicated at **20B**. Each layer comprises a film having a thickness in the area of .005-.015 inches. A plurality of layers such as five or six, or more, can be utilized. As can be seen, the packaging material **20** includes a generally flat portion **34** and a plurality of domes **30** extending in various directions, i.e. up dome **30A** or down dome **30B** in a plurality of sizes such as small dome **30C** and large dome **30D**. The variation in dome size and direction serves to prevent the re-nesting of sheets of the packaging material **20** after same are separated. Domes of one size, two sizes, or many sizes and shapes can be used, as desired. Likewise, the domes can extend in one direction or both directions. As can further be seen in viewing **FIG. 1**, the two layers **20A** and **20B** take up a minimal amount of space as same are nested together. By "nesting" it is meant that there is no air space between the adjacent layers **20A** and **20B** at the flat portion **34**, as well as at the domes **30**. In use, as will be hereinafter discussed, after layers **20A** and **20B** are separated and disoriented, the domes **30** and

the respective layers **20A** and **20B** serve to separate the layers **20A** and **20B**, and take up a much larger amount of space to function as a packing material.

FIG. 2 is a cross-sectional view of a dome **30** of the domed packing material **20**. The flat portion **34** of the domed packing material **20** is also shown. The flat portion **34** has a thickness of T , which tapers to a thickness of t at an upper portion of the dome **30**. This difference in thickness of the material comprising the dome **30** is accounted for by the stretching associated with forming a dome **30** in the domed packing material **20** which is formed of a polymeric material and stretches during the dome formation process. Additionally, the dome has a height H , a diameter W . Finally, the dome **30** extends from the flat portion **34** at an angle indicated at θ . The angle θ can clearly be varied as desired. Indeed, the shape of the domes **30** can be varied from dome shapes to any other shape such as pail shaped, square, star shaped, elongated, etc., as desired. However, angles of 45 degrees or less are thought to provide the necessary structural compression resistance.

FIG. 3 is a cross-sectional view of the packing material shown in **FIG. 1** taken along line 3-3. As can be seen, the domed packing material **20** includes large up dome **30A**, and smaller down dome **30C**. Flat portion **34** is also pictured. As previously set forth in describing **FIG. 1**, the domed packing material **20** as shown includes a lower layer **20A** and an upper layer **20B**. Additional layers would normally be formed at the same time. Up dome **30A** has a diameter W , and a height of H for each layer **20A** and **20B**. For domes to nest completely, each successive dome needs to be smaller, or respectively larger. An unexpected observation is that the change in size affects the side-to-side diameter, but not the height. It is believed that suitable heights H

for the domes are approximately $\frac{1}{8}$ to $\frac{5}{16}$ of an inch, but this can be varied as desired. Further, each layer **20A** and **20B** has a thickness **T** along the flat portion **34** (on the order of .009 inches thick) and a thickness **t** at an upper portion of the dome **30A**. **T** is greater than **t** (**t** may be about 30% less than **T**) based on the stretching that occurs during formation of the dome **30**. Similarly, small down dome **30C** had a diameter **w** and a height **h**. The height **h** of the dome **30C** is the same for both layers **20A** and **20B**. Also, there is a difference between the thickness **T** of the base **34** and the thickness of the small down dome **30C** at a mid-portion thereof, again caused by the stretching that occurs during dome formation.

Because the layers are formed together as one single assembly, each dome will be a slightly different shape so that all stacked domes will necessarily nest absolutely tightly.

Referring now to **FIGS. 4-8**, a method of forming a plurality of layers from a single substrate, for forming domes therein, is disclosed. First, as shown in **FIG. 4**, a sheet of material **40** includes a longitudinal fold line **42** which divides the sheet into first half **44** and second half **46**. Referring to **FIG. 5**, when the sheet **40** is folded in direction of arrow **F** to position the second half of the sheet **46** over first half of the sheet **44**, the sheet becomes half size. A first lateral fold line **50** and a second lateral fold line **52** are provided to divide the sheet **40** further into upper portion **54**, middle portion **56** and lower portion **58**. Referring to **FIG. 6**, upper portion **54** can be folded onto middle portion **56** along fold line **50** in a direction shown by arrow **G** and thereafter, lower portion **58** can be folded over upper portion **54** in the direction of arrow **H** to fold the substrate **40** to a panel having one-sixth of its original size.

Thereafter, as shown in **FIG. 7**, the folded material can be processed to form domes **30** in substrate **40** in accordance with the teachings of the present invention. Thereafter, the sheet can be unfolded as shown in **FIG. 8** and portions **60** with domes **30** can be separated from the sheet **40** for use. Alternatively, the sheet can be re-folded, along different fold lines than those already provided to effectively disorient the domes **30** such that the material generally takes up a large amount of space. Alternatively, more than one panel **60** can be utilized together to function as packing material. Importantly, the product shown in **FIG. 8**, if, for example, the substrate **40** is a eight and one-half by eleven inch assembled sheet, or other standard size, it can be easily packaged in a standard office box or other convenient package and can be easily stored, displayed and purchased because it does not take up a large amount of space and can be easily handled in a manner similar to the way other packages of similar sizes are handled. Accordingly, the nested packing material of the present invention can be provided in a compact package desirable to the retailer and consumer.

Referring to **FIG. 9**, another process for manufacturing the domed packing composite of the present invention is presented. As can be seen, a plurality of rolls **70** of substrate material such as plastic sheets **72** are provided. Sheets **72** are fed into a first roller **74**, where the sheets are put together to form a composite sheet, and then to a second roller **78** which serves to feed the composite sheet **76** formed by the plurality of layers **72**. The composite sheet **76** is then fed into processing station **80** where domes are formed in the material to provide a domed sheet **82**, which is again fed through third rollers **84** to pull the domed sheet **82** from the processing station **80** and feed the domed sheet **82** to a cutting station **86** wherein the domed sheet **82** is cut into desired sizes for packaging.

FIG. 11 shows another embodiment of a manufacturing process according to the present invention wherein a plurality of rolls, generally indicated at **170**, of plastic sheets **172** are fed to a first roller **74** which combines the sheet into a composite sheet **176** which is then fed through textured rollers **180** which forms domes in the material to produce a domed sheet **182** which is then fed through a tensioning second roller **184** and then fed to cutting station **186** or, which can be packaged into rolls **190**.

Referring now to **FIGS. 10A-10D**, a series of processing steps is shown in connection with a batch method of manufacturing the dome packaging material of the present invention. As shown in **FIG. 10A** a substrate **90** is fed into a press, generally indicated at **100** in a direction shown by arrow J. The substrate **90** can include a plurality of layers such as lower layer **90A**, middle layer **90B** and upper layer **90C**. The press **100** includes an upper press **110** and a lower press **120**. The upper press **110** includes an upper clamping plate **112** that is driven by clamping pistons **114** and dome ejector **115**. The upper press **110** further includes dome die **116**, dome die plate **118**, and dome dye piston **119**. The lower press **120** includes a fixed lower base clamp plate **122**, a dome ejector **125**, lower dome die **126**, dome die plate **128** and dome die plate piston **129**. Die domes **116** and **126** preferably have rounded edges to stretch but not pierce the substrate **90**.

As shown in **FIG. 10B**, the substrate **90** is maintained between upper and lower clamp plates **112** and **122** respectively by actuating clamp pistons **114** to move the upper clamp plate **112** in the direction shown by arrows K to sandwich the substrate **90** against the fixed lower base clamp plate **122**.

Referring to **FIG. 10C**, after the substrate **90** is retained between upper and lower clamp plates **112** and **122** respectively, the upper and lower dome die plates **118** respectively are engaged by actuating dome ^{die 118 6/26/02} pistons **119** and **129** respectively to force dome dies **116** and **126** in the directions shown by arrows **L**, against the substrate **90** and into receptacles **113** and **123** (**FIG. 10B**) of clamp plates **112** and **122** respectively, to deform the substrate **90** to form domes **30** therein. Importantly, it is desirable that the receptacles **113** and **123** have angled or rounded edges **113A** and **123A** (**FIG. 10D**), respectively, to allow the substrate **90** to slide and stretch instead of breaking.

FIG. 10D shows the separation of upper and lower presses **110** and **120** in the directions of arrow **M** which allows for the substrate **90** with domes **30** to be removed from the press. Importantly, dome ejectors **115** and **125** may be needed to fully eject the domes **30** from the receptacles **113** and **123**. The dome ejectors **115** and **125** could be air conduits and a blast of air in the direction shown by arrows **N** would be sufficient to disengage the domes **30** from the receptacles **113** and **123**. Importantly, as can be seen, the layers forming substrate **90**, and the domes **30** formed therein, are completely nested. In use, the layers forming substrate **90** are separated and disoriented to provide a packing material that takes up a large volume of space.

FIGS. 12A and **12B** show protuberances formed in substrates according to the prior art. Previously, various substrates are separately manipulated to form identical domes. Such identical domes, cups or other protuberances can never nest completely because the outside diameter of the next dome can only fit to where the inside diameter of the previous one allows it. This results in air spaces, **26**, between the tops of the domes and between the substrates.

Consequently, the layers and protuberances of the prior art are at best "loosely stacked." This results in a bulky product that does not have all the benefits of the present invention, e.g. the nesting which permits the domed packaging material to occupy a minimal amount of space prior to use. Also, large sheets cannot be made by folding and forming and then unfolding.

FIG. 13 is a schematic diagram showing a key where 0 indicates a down dome and an X indicates an up dome. Thereafter, a pattern or algorithm of up and down domes is presented which is believed to provide a pattern that, after formed in a plurality of layers of a substrate, when the layers are separated and disoriented, it is believed that this pattern will tend to reduce the re-nesting of the layers. Importantly, any pattern or dome shapes that are non-repetitive would serve to decrease the likelihood of re-nesting. While any pattern of domes is considered to be within the scope of the present invention, the more non-repetitive, the better. As can also be seen with **FIG. 13**, besides varying domes from up and down, they can also be varied in positioning, i.e. they can be in front or behind, i.e. they can be aligned vertically (square) or diagonally to further decrease repetitiveness, and consequently, decrease the likelihood that separated layers will re-nest.

FIGS. 14 and **15** are side views of up and down or down only respectively, dome patterns made in accordance with the present invention wherein the domed patterns can be formed in adjacent layers for example, layer **120A** and **120B** in **FIG. 14** and layers **220A** and **220B** in **FIG. 15**. In a formed position, the layers have the same pattern of domes formed therein, but when the layers are separated and disoriented, the dome patterns tend to resist and prevent re-nesting and

serve to maintain the packing material in a condition wherein same takes up a relatively large space.

Importantly, the product of the present invention can be made utilizing a cold or thermoforming process, or in other ways known in the art. Also, the present invention is very suitable for use with recycled scrap polymeric materials as long as they are ductile when at heated or cold temperatures and flexible and elastic in their natural state. One example of an appropriate material is PETE (amorphous polyethylene terephthalate). ^{PS 6/26/00}

^{PS 6/26/00}
Importantly, ~~after use~~, one can easily dispose packing material after use in any desired manner. While packing material such as bubble wrap continues to occupy space after use, the domes of the present invention can be collapsed by the application of sufficient pressure.

Having thus described the invention in detail, it is to be understood that the foregoing description is not intended to limit the spirit and scope thereof. What is desired to be protected by Letters Patent is set forth in the appended claims.

CLAIMS

What is claimed is:

1. A domed packing material comprising:

a substrate comprising a plurality of layers; and

a plurality of domes formed in the substrate;

wherein the domes formed in the substrate nest to take up a minimal amount of space, and can be separated and disoriented to occupy a larger space.

2. The packing material of claim 1 wherein the domes vary in size and shape.

3. The packing material of claim 2 wherein the domes vary in direction.

4. The packing material of claim 3 wherein the domes are varied in positioning.

5. The packing material of claim 1 wherein each dome in the plurality of layers has the same height.

6. The packing material of claim 1 wherein the domes nest completely.

7. A method for forming a domed packing material comprising:

providing a substrate;

folding the substrate to form a plurality of layers;

forming domes in the folded substrate;

unfolding the substrate to ^{regain the size of the original sheet} ~~disorient the domes~~; and US 6/26/00

utilizing the domed substrate as packing material.

8. The method of claim 7 wherein the dome substrate further includes perforation lines for removing portions of the substrate for use as a packing material.

9. The method of claim 7 wherein the substrate is eight and one-half by eleven inches and can be packaged in a standard letter paper size box.

10. The method of claim 7 wherein the substrate is eight and one-half by fourteen inches and can be packaged in a standard legal paper size box.

11. A method of making a domed packing material comprising:

providing a plurality of film layers;

positioning the layers together to form a composite substrate;

forming a plurality of domes in the composite substrate; and

packaging the domed composite substrate.

12. The method of claim 11 further comprising varying the size of the domes.

13. The method of claim 12 further comprising varying the shapes of the domes.

14. The method of claim 13 further comprising varying the direction of the domes.

15. The method of claim 14 further comprising varying the positioning of the domes.

16. The method of claim 11 wherein the domed composite material can be utilized as packing material by separating layers; disorienting the layers; and positioning the layers about an item to pack same.

17. The method of claim 11 wherein domes are formed continuously by textured rollers.

18. The method of claim 11 wherein domes are formed in a press.
19. The method of claim 11 wherein the domed composite substrate is packaged in rolls.
20. The method of claim 11 wherein the domed composite substrate is cut and packaged in a stack relationship.
21. The method of claim 11 wherein the domed composite substrate is folded and stacked and packaged in boxes.
22. The method of using a domed packing material comprising:
- obtaining a piece of composite domed packing material having a plurality of layers with domes;
- separating the layers;
- disorienting the layers; and
- utilizing the disoriented layers to place about an object to be packed.
23. The method of claim 22 wherein the step of obtaining a piece of domed composite packing the material comprises cutting a desired length off the roll

24. The method of claim 22 wherein the step of obtaining a piece of domed composite packing material comprises choosing a proper size piece of material.

25. The method of claim 22 wherein after use, the material is discarded.

26. The method of claim 23 wherein prior to discarding the domes are crushed flat.

27. A press for forming domes in a substrate including a plurality of layers comprising:

an upper press having a clamping plate with a receptacle therein and a die plate with a dome die;

a lower press having a clamping plate with a receptacle and a lower die plate with a dome ^{or without} die; ^{PS 6/26/00}

the upper and lower clamp plates positionable together to engage the substrate; and

the upper and lower die plates with dome ^{dies} ^{PS 6/26/00} ~~dies~~ movable to extend into the receptacle of the lower and upper clamp plates to deform the substrate to form domes therein.

ABSTRACT

A packing material having a plurality of domes formed therein, and methods for forming same are provided. A plurality of layers of a substrate are placed together to form a composite material with a plurality of layers, and domes are formed in the plurality of layers. The domes can be formed in more than one direction and can be of different sizes and shapes. Thereafter, the materials can be cut to desired sizes or shapes. The domes formed in the layers are nested and accordingly, the packaging material takes up a minimal amount of space after same is manufactured. This serves to minimize the expense and space requirements for storage and shipping and disposal. In use, the sheets are separated and disoriented to achieve bulk and are utilized for packing. The domes are sized, shaped and positioned to tend against re-nesting.

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FIG. 1 is a perspective view of a container 20 for holding a plurality of articles 30. The container 20 includes a plurality of compartments 34. Each compartment 34 is defined by a pair of opposed side walls 20A, 20B and a bottom wall 20. The articles 30 are held in the compartments 34. The articles 30 are of a generally oval shape and have a top surface 30A and a bottom surface 30B. The articles 30 are held in the compartments 34 by a top wall 30C and a bottom wall 30D. The articles 30 are held in the compartments 34 by a top wall 30C and a bottom wall 30D.

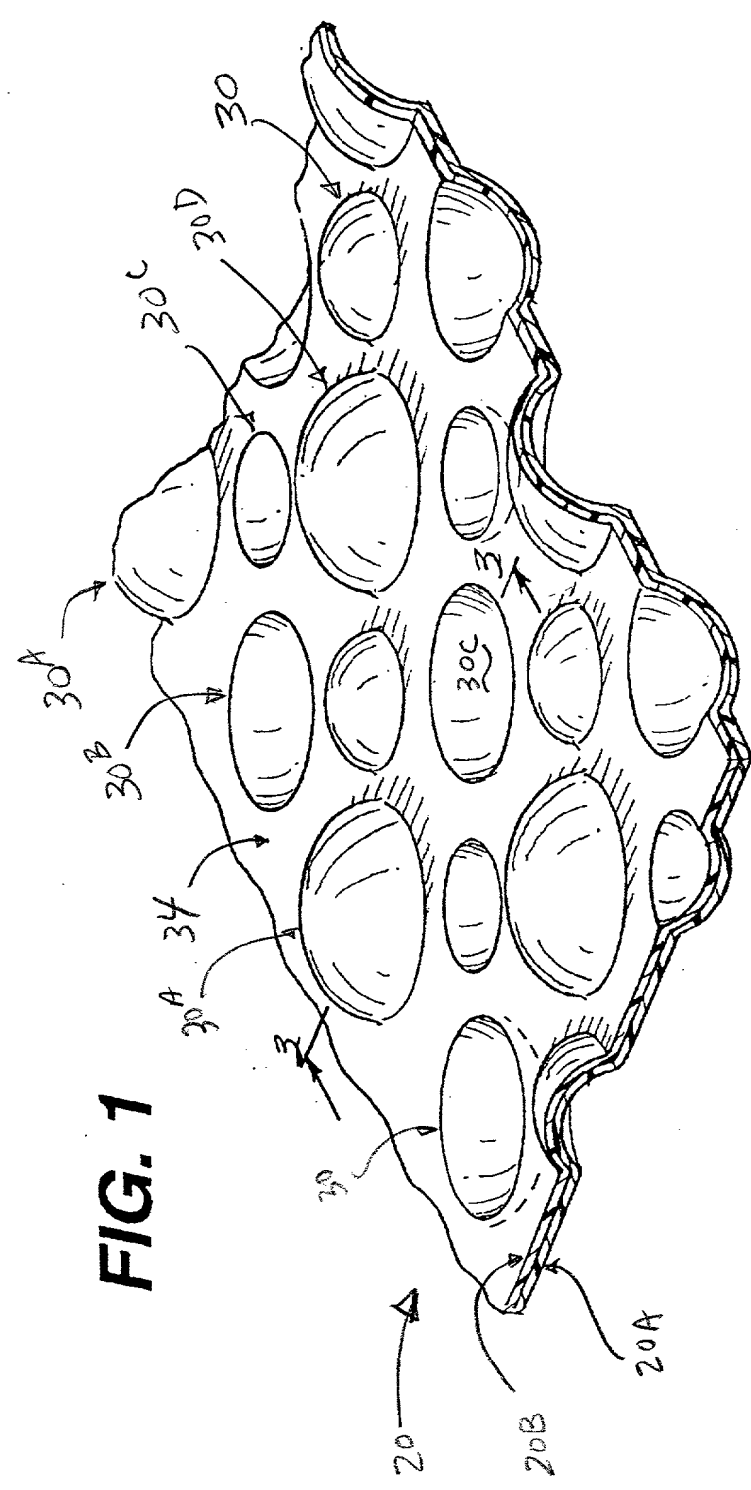


FIG. 1

FIG. 2

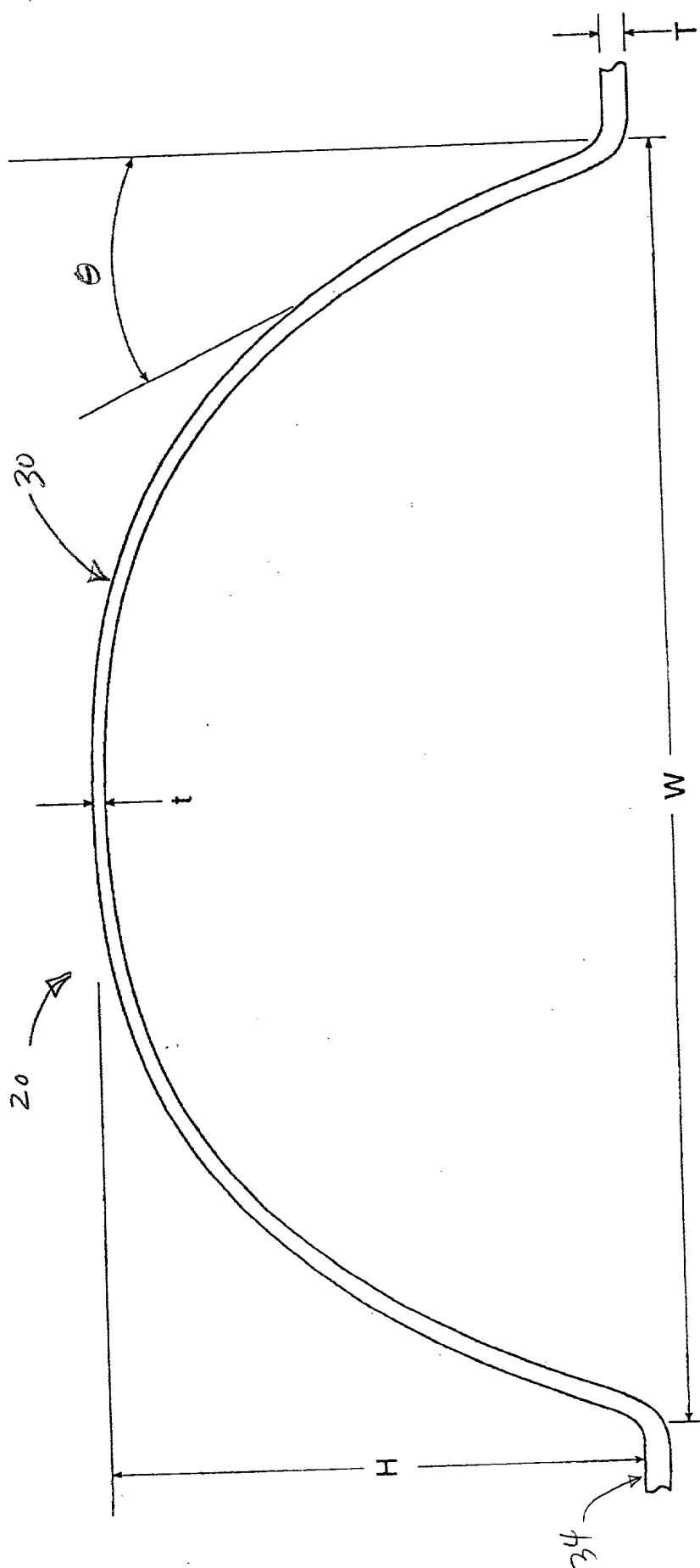


FIG. 4

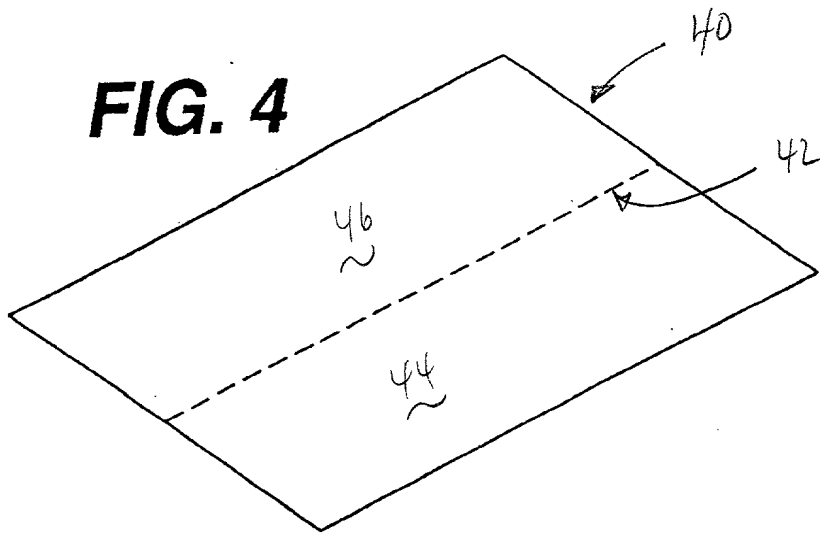


FIG. 5

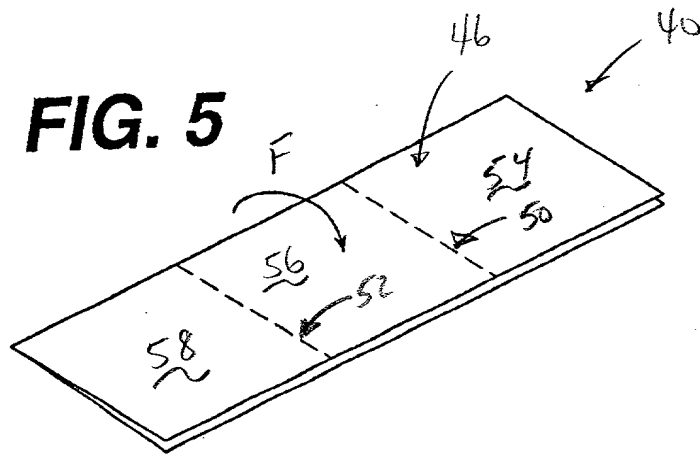


FIG. 6

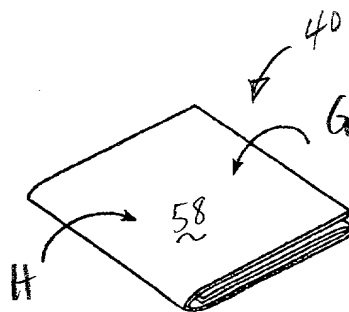


FIG. 7

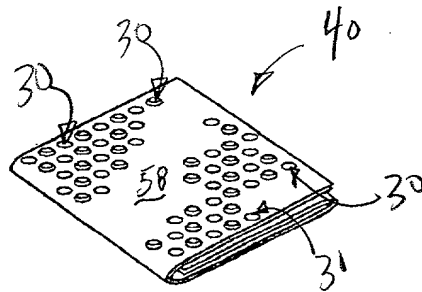
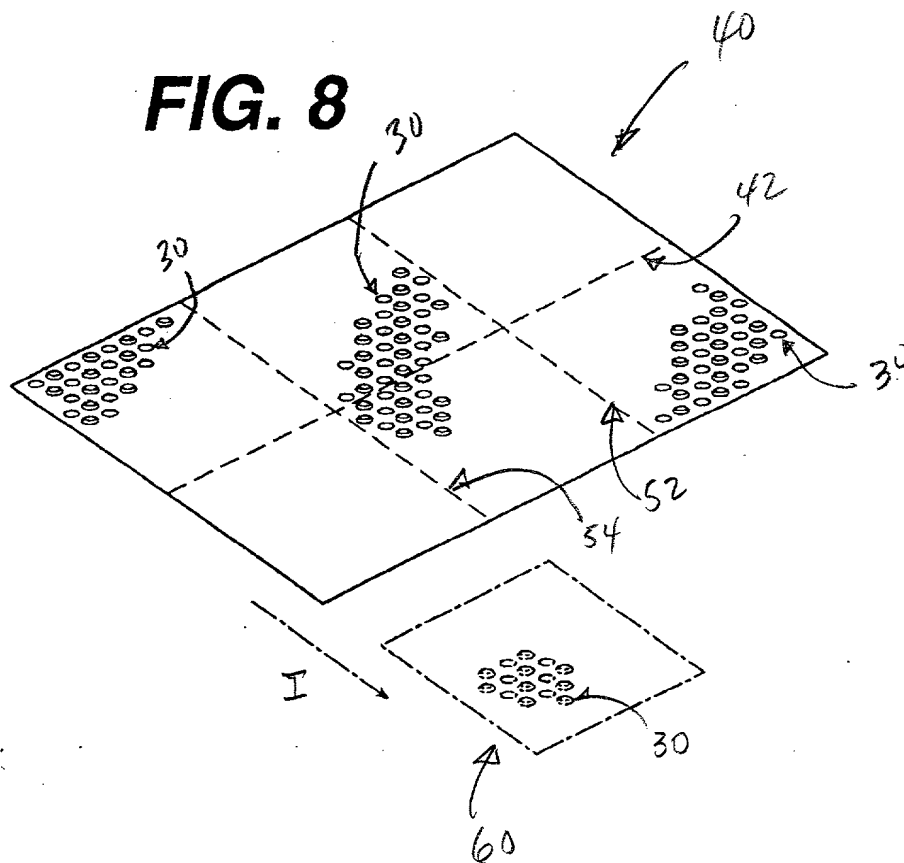


FIG. 8



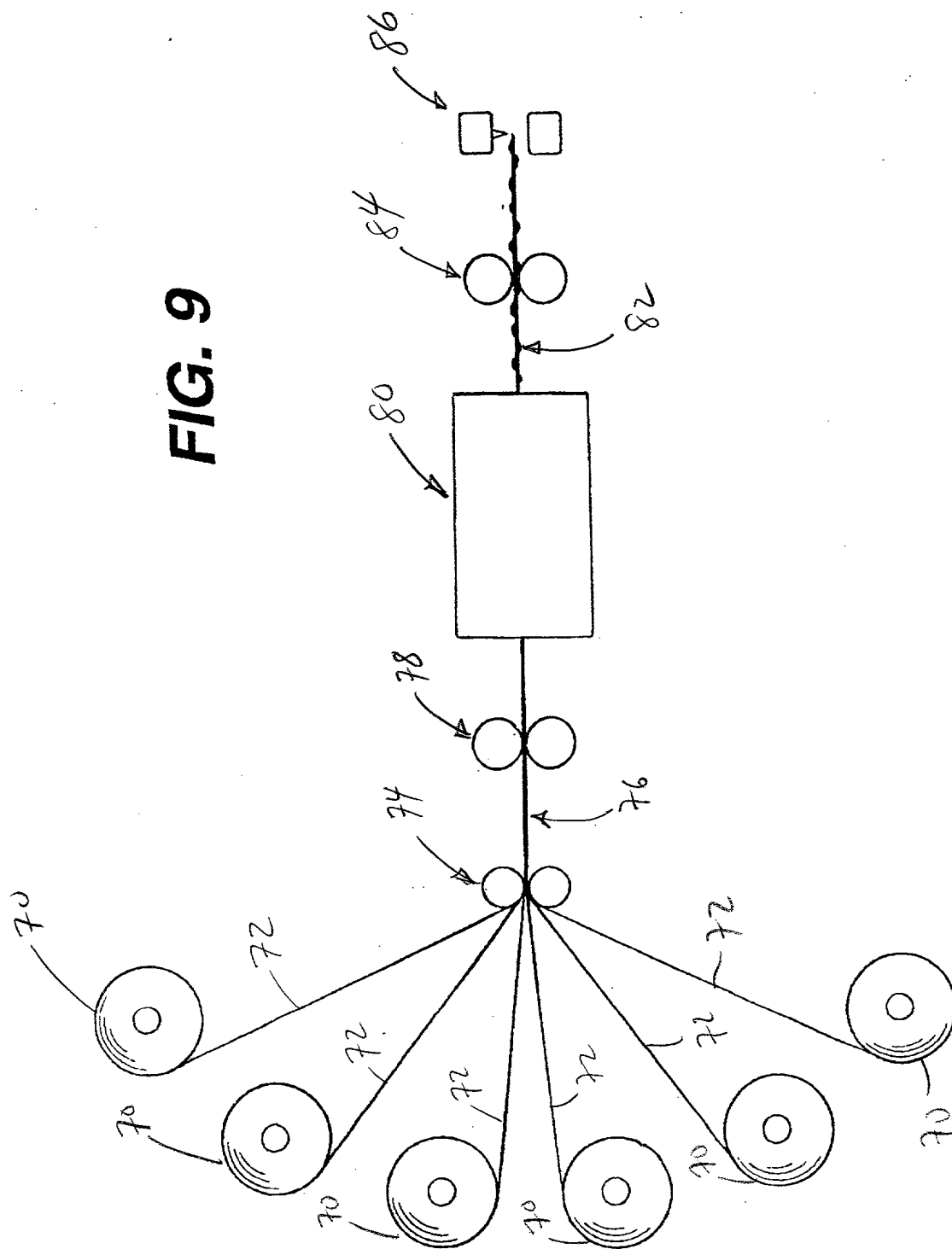


FIG. 10A

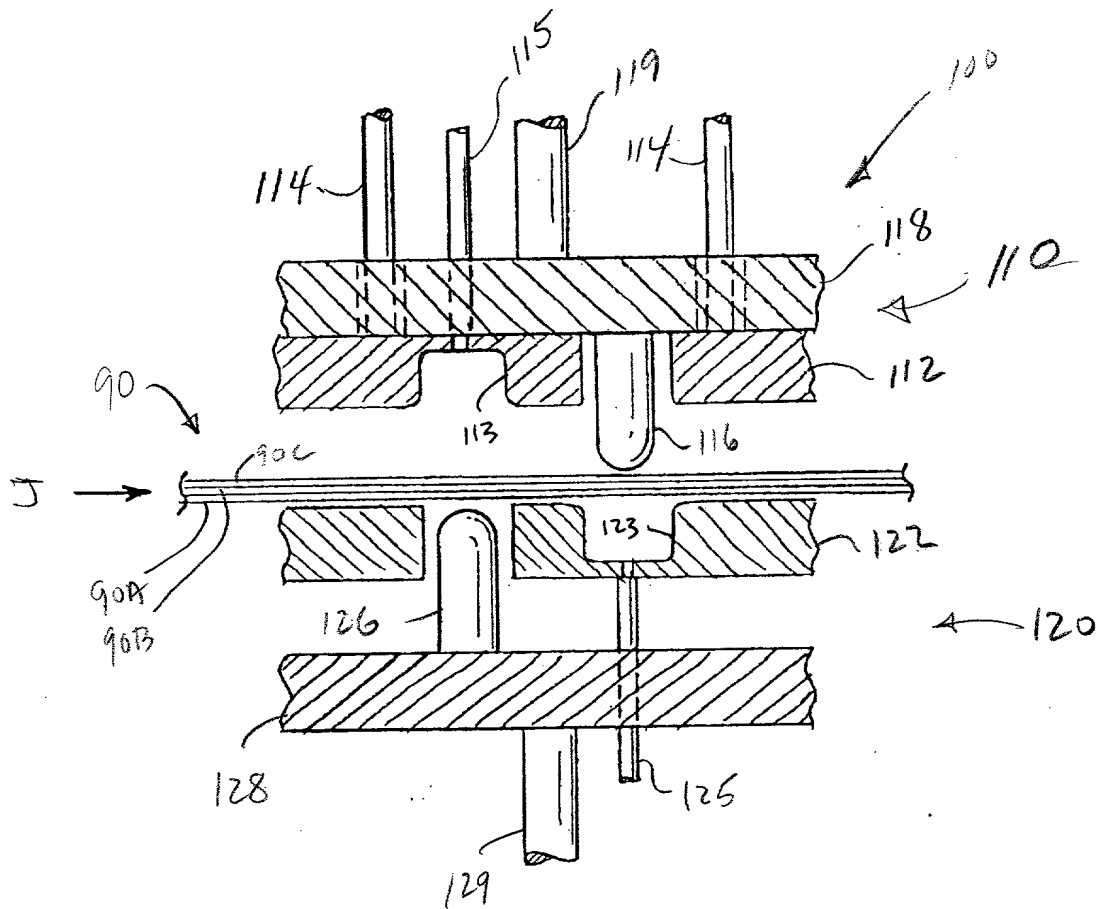


FIG. 10B

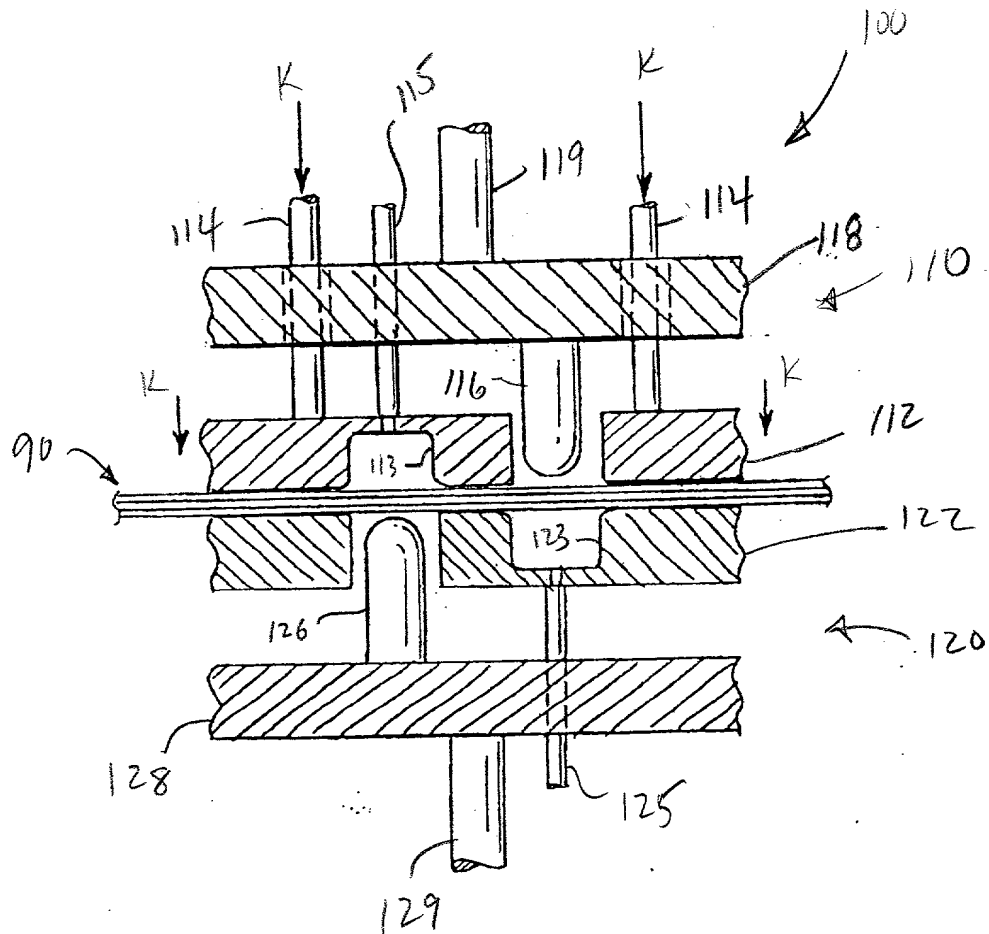


FIG. 10C

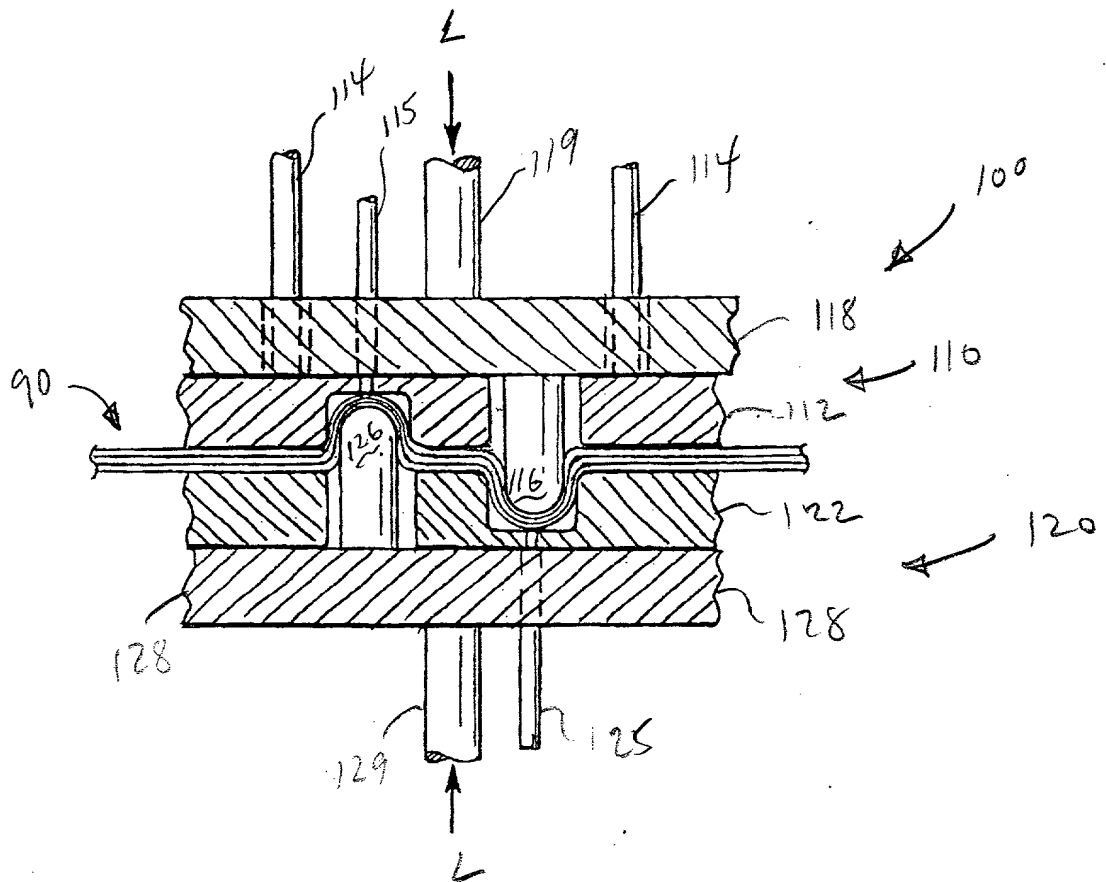


FIG. 10D

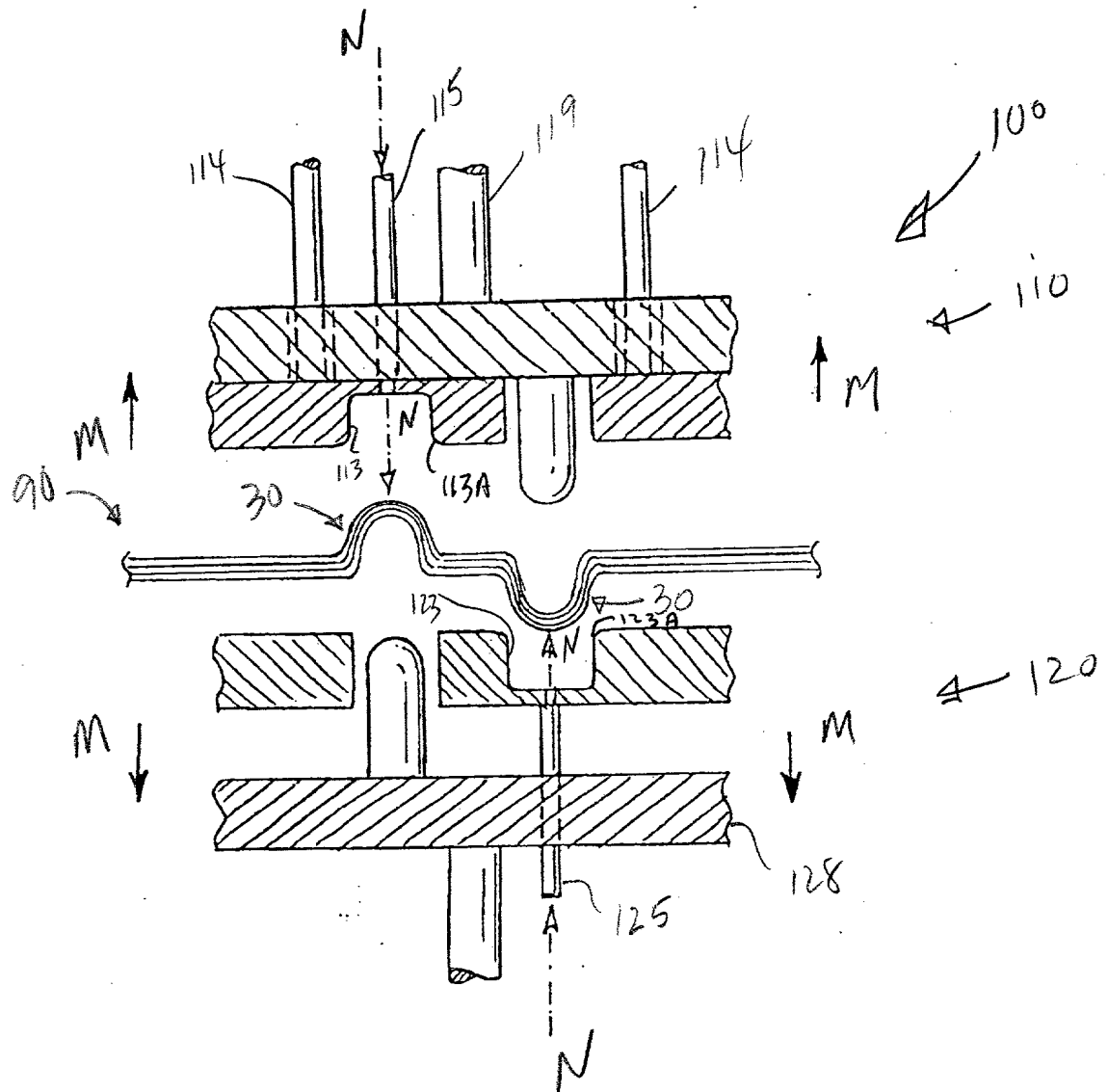


FIG. 11

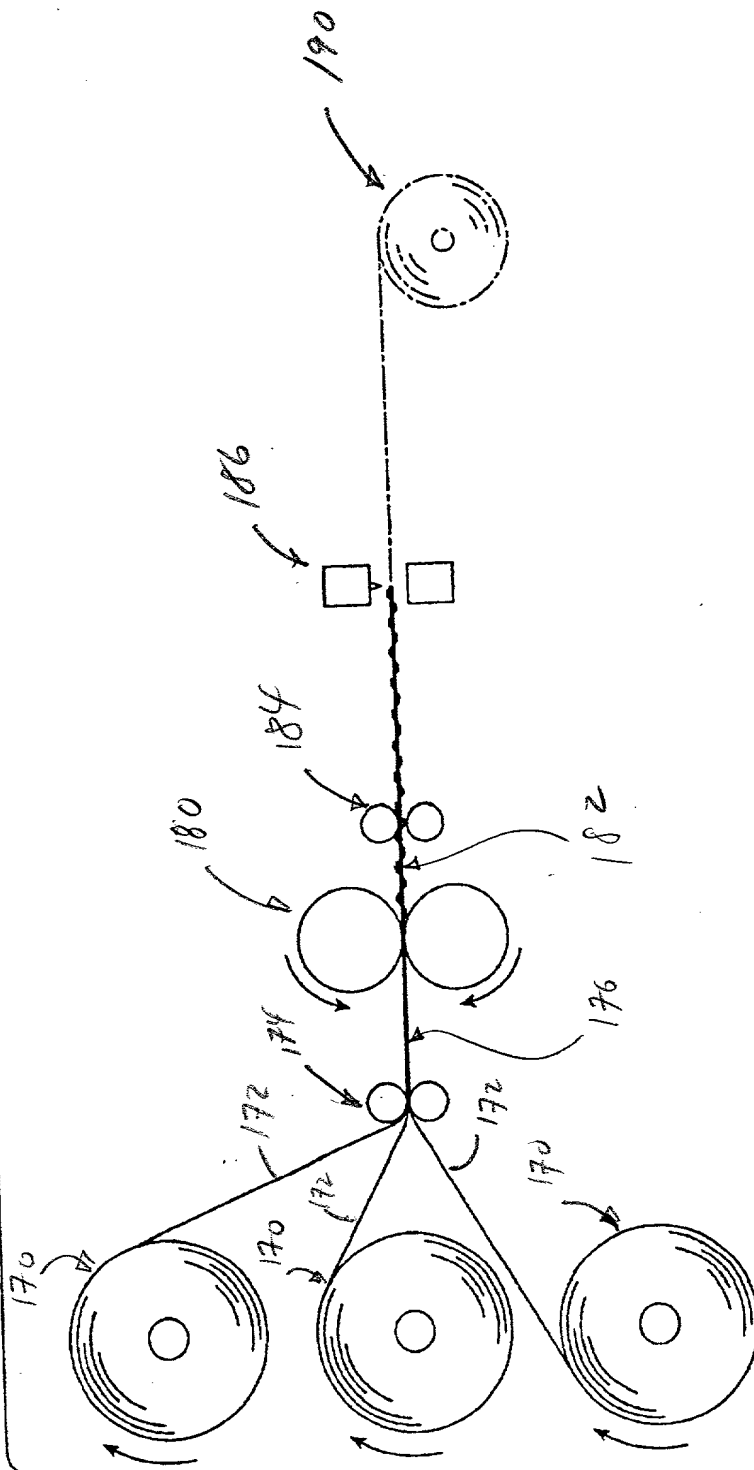


FIG. 12A *PRIOR ART*

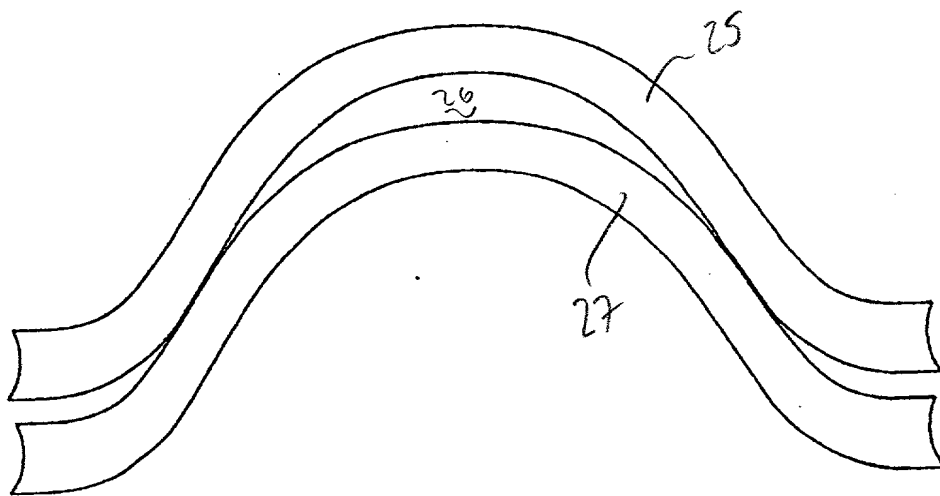


FIG. 12B *PRIOR ART*

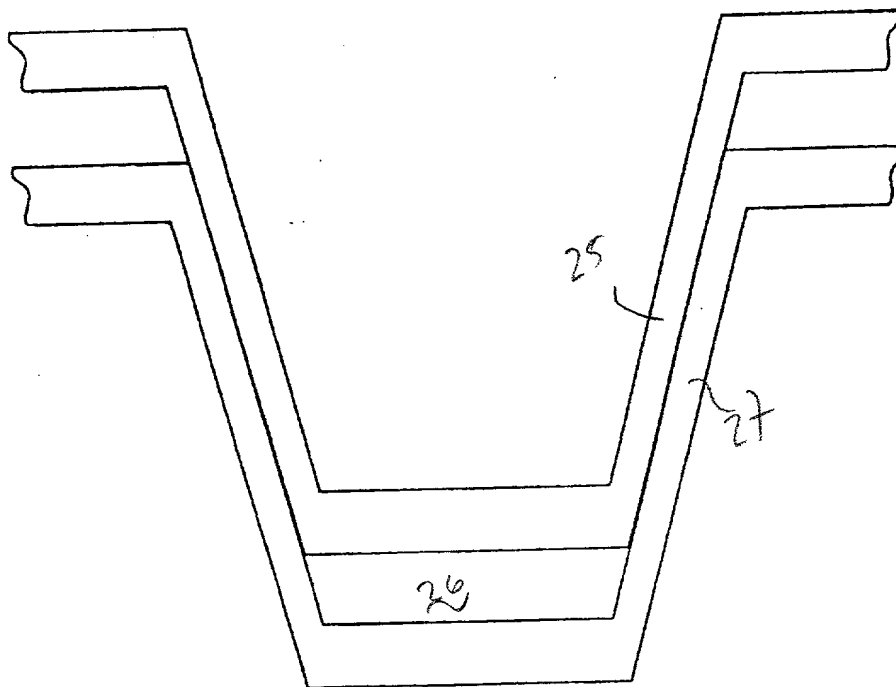


FIG. 13

O = Down dome; X = Up dome

O X O O X O X X	Original algorithm
X O O X O X X O	One letter forward, square
O O X O X X O X	Ditto, diagonal
O X O X X O X O	Ditto, diagonal
X O X X O X O O	Ditto, square
O X X O X O O X	Ditto, square
X X O X O O X O	Ditto, diagonal
X O X O O X O X	Ditto, diagonal

FIG. 14

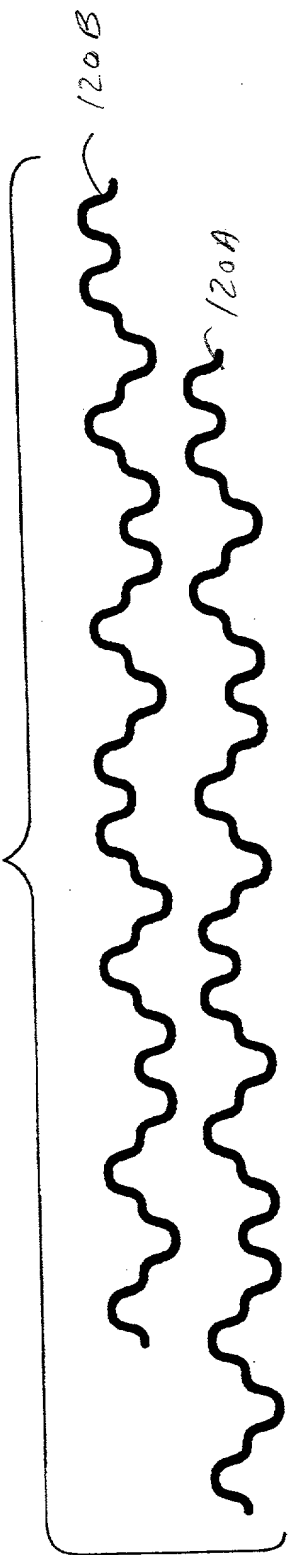
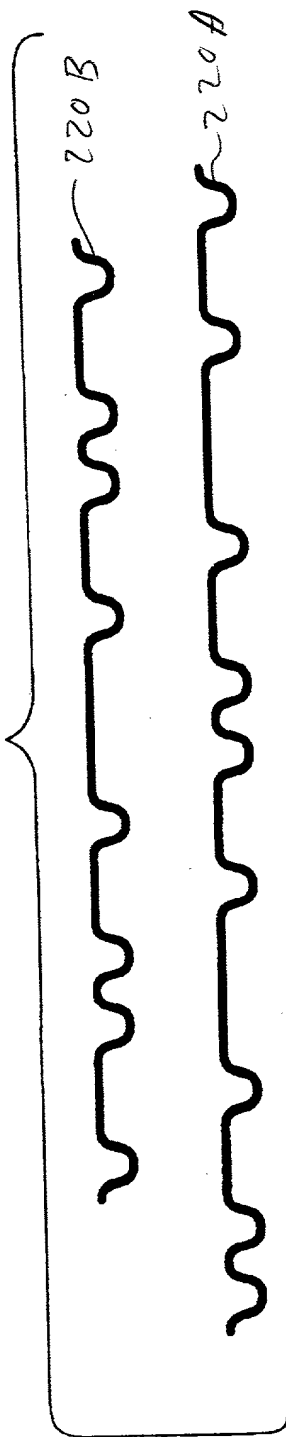


FIG. 15



Docket No.

7954/1

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled
DOMED PACKING MATERIAL

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International
Application Number _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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Second inventor's signature	Date
Residence	
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Post Office Address	